

To: Chairperson and Authority Members **Date:** January 4, 2002
From: Mehdi Morshed, Executive Director
Subject: Agenda Item 7 – Quantm Alignment Optimization Report

Discussion:

To further clarify the screening decisions to be made on the alignment options in both the northern and southern mountain passes an alignment optimization and refinement effort has been undertaken. This task is intended to analyze the range of horizontal and vertical alignment options in an iterative manner to provide more certainty concerning alignment selection, cost estimates and potential impacts. This analysis/optimization of literally millions of alignment options are made possible in a relatively short period of time with the “Quantm” automated alignment optimization and refinement system that is now widely used in Australia and was initially developed for the Australian Very Fast Train (VFT) project.

The Program Management and Regional Study Teams worked with Quantm to analyze the alignments using data collected for the screening analysis, and previous studies. Immediately following the Authority’s ‘Tunneling Summit’, the relevant conclusions from this tunneling conference were incorporated into the Quantm alignment optimization study. An executive summary on the methodology used and results of the optimization task is attached (the full 75-page report is available upon request). Although this work was completed over a three-week period (including one-week for training), the results are quite remarkable. Because “millions” of alignment options have been evaluated, the Authority can have a very high level of confidence that all possible route alignments – that meet the established design criteria – have been investigated and the “optimal alignments” selected to represent each corridor alternative are those that minimize cost and the amount of tunneling. The results for the Northern California mountain pass are the most striking. In past study, the Pacheco Pass was estimated to have no less than 12-miles of tunneling; using Quantm, an alignment has been created that reduces the total amount of tunneling to just over 5-miles. Furthermore, the 31-mile “Direct Tunnel” alternative can now be replaced by a new alignment that totals only 11-miles of tunneling – with no single tunnel exceeding 5-miles in length.

Originally, the alignment optimization (and the agreement with Quantm) was to be solely for the investigation of the southern mountain pass between Sylmar and Bakersfield. Once this work was underway, and the tunneling summit conclusions became available, it was clear that the Quantm system would be ideal for determining optimized alignments for the northern mountain pass alternatives as well. A subsequent agreement was reached to use Quantm tool for the northern mountain pass using additional funds from the Authority’s operating budget. The southern mountain pass investigation was funded from the Proposition 116 funds for studies between Los Angeles to Bakersfield.